AIR CLEANING PROBLEMS AT NRTS

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The National Reactor Testing Station's air cleaning problem is similar in most respects to that encountered elsewhere. However, we do have conditions that are somewhat different from that normally encountered.

The terrain on which our reactors are constructed is in a fairly flat desert area with sagebrush being the principal vegetation. Once the sagebrush is removed and the ground disturbed, the dust problem becomes intense. Soil stabilization is required at all our plants as a means of dust control. Fortunately the natural ground, if undisturbed, is fairly stable. Winds are rather common and at times of fairly high velocity. Prefiltering of all air is, therefore, required in all our plants.

The Chemical Processing Plant is the NRTS's only plant to date requiring air cleaning facilities above that normally required. All air entering the plant is cleaned by the use of capillary air washer filters. The Hood system uses C W S filters and exhaust direct to the atmosphere through vents located on the plant roof.

Positive pressure ventilation is supplied to the cold areas in the plant by 2-60 HP fans. This air is distributed to the cold area and flows to the roof vents or to the hot areas. After passing through the cells, the hot area ventilation emerges in two vent tunnels on each side of the building. These vents go to the fan building via an above ground metal duct.

The fan building contains 2-75 HP fans which draw air from the above ducts and discharge it directly to the stack without filtering. The stack has a minimum diameter of 10 feet and is 250 feet in height. A stack heater is provided to increase the stack draft during periods of adverse weather conditions.

The sampler off-gas ventilation system takes its air from the cold areas, draws it over the sample bottles and through fiberglas filters. Two fans discharge the filtered air directly to the metal duct leading to the fan house.

All vessel off-gas is vented separately and operates under reduced pressures with respect to the cells. This air is discharged through a six inch stainless steel pipe to fan house where the air is filtered through special fiberglas filters before being exhausted to the stack by 2 - 2400 cfm fans.

These gases are filtered through fiberglas filters and discharged to the stack by a steam jet.

The Materials Testing Reactor air is prefiltered on entering the reactor. That air used to cool the graphite core, and at present the only contaminated air of any volume, is filtered and monitored before being discharged to a 5 foot diameter 250 foot stack for dispersion to the atmosphere.

The Experimental Breeder Reactor air is prefiltered by use of electrostatic air cleaners (precipitron) and that air used to cool the outer core is again filtered and monitored before being discharged to the atmosphere through a 50 ft. metal stack on top of the reactor.

The Ship Thermal Reactor air cleaning problem can be considered as routine. They have provided special filtered force air discharge to the atmosphere through metal stacks located on top of the reactor in event of trouble involved in the dismantling or repair of the reactor.

A new gas treating problem and one involving greater volumes than any of our other plants, including the Chemical Processing Plant, is the new ANP Project. The testing and operations of a nuclear aircraft engine will involve a very complex air treatment problem.

Some of the problems to overcome are: (1) Treatment of high air temperatures. (2) Limited restriction on the amount of back pressure permitted through the filtering process. The efficiency of these engines drops off rapidly with any degree of back pressure. (3) A stack 150 feet in height and 20 feet in diameter will have an effective stack height of around 600 feet under the above conditions and a 15 mph ambient air velocity.

Dust will be one of three likely sources of radioactive contaminants to remove. That dust in the air, on being drawn through the nuclear engine, will be highly contaminated on discharge. Fuel element erosion particles will be another contaminant that will have to be removed. Possible fuel element rupture also must be considered in the air cleaning design. Radioactive argon may be a contaminant that will have to be removed. The degree or percentage of each contaminant to remove can only be estimated. The dust problem can be partially corrected by selecting the day in which to run the engine tests. The U. S. Weather Bureau will be the chief consultant in this matter. Fuel element, erosion and rupture have yet to be firmed up, but they hope to have it by test time.

The extreme temperatures at which the gases are discharged will create a filtering problem but will help by reducing the required stack height for adequate dispersion.

Doctors Silverman and Lapple have both been retained as consultants on these problems and can probably give you a much more detailed account of the problem encountered should you be interested.